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Prevalence of Geriatric Syndromes among Older Adults Living in the Community in the Central Mahalapye Sub-District, Botswana

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Abstract

The study aimed to describe the prevalence of geriatric syndromes among older adults living in the community. In addition, we evaluated the relationship between frailty and socio-demographic factors and other geriatric syndromes in the Central Mahalapye sub-district, Botswana. This cross-sectional study recruited 414 older adults from the community using the Botswana Pension Office's roster. We employed a systematic random selection method to recruit 160 older adults in three main villages and we randomly chose 150 elderly individuals in 10 research villages also randomly selected using Microsoft Office. We used the brief-assessment-tool-for-comprehensive-geriatric-assessment to collect information about geriatric syndromes. We conducted a multivariate analysis using binary logistic regression to determine the relationship between the independent variables (sociodemographic factors and other geriatric disorders) and frailty. Most of older adults had geriatric syndromes, particularly Instrumental-Activity-of-Daily-Living impairment (n= 328, 79.2%). About half of the participants were at nutrition risk (n= 261, 63.0%)), had a mood disorder/ depression (n= 237, 57.2%), had visual impairment (n= 245, 59.2%), or were frail (n= 219, 47.1%). In approximately one-third of cases, participants reported hearing impairment (n= 127, 30.7%) or having experienced at least one fall in the past year (n= 117, 28.3%). Factors such as high education level, living with a partner, urinary incontinence, and cognitive impairment influenced frailty ($p<0.05$). We intend to explore the potential impact of family size (despite pension allowance), alcohol consumption, oral health issues, and tooth loss on the nutritional vulnerability of elderly individuals in Sub-Saharan Africa, with a particular emphasis on Botswana.

Keywords: *Brief-Assessment-Tool-for-Comprehensive-Geriatric-Assessment, Frailty, Geriatric Syndromes, Rural Older Adults.*

Introduction

By 2050, projections indicate that the global population will double, with 80% of this growth-taking place in low- and middle-income countries. [1]. As individuals age, their reserve capacity, known as stenosis, decreases, leading to increased energy expenditure and a diminished ability to adapt to stress or disease. This can lead to geriatric syndromes.

Geriatric syndromes are complex health conditions that significantly impact the functionality and life satisfaction of older adults There are multifaceted medical disorders that hinder motor, sensory, and emotional abilities [2]. Comprehensive geriatric assessment (CGA) refers to a comprehensive and holistic strategy that involves evaluating the health requirements of

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older individuals, particularly the evaluation of geriatric syndromes [3].

Senn et al. proposed the Brief Assessment Tool (BAT) for CGA as a means to expedite geriatric syndromes screening in primary healthcare (PHC) settings, often taking only two to five minutes [4]. Geriatric syndromes, which are commonly observed in primary healthcare, consist of a variety of conditions, including decreased functionality (activity of daily living [ADL] and instrumental activity of daily living [IADL]), impaired balance, gait, falls, polypharmacy, osteoporosis, and frailty. Furthermore, these syndromes may involve nutritional risk that leads to malnutrition, diminished sensory perception (including visual and hearing impairments, as well as urinary incontinence), and mental disorders such as cognitive decline and depression.

The prevalence of geriatric syndromes among older adults increases with age. Also, its prevalence varies by region and ethnicity. Bulut et al. found that around half of the outpatient clinic-aged people had polypharmacy and urine incontinence, whereas one-third had depression, dementia, falls, sarcopenia, and frailty [5]. Frailty is a ubiquitous geriatric condition that interacts with other geriatric illnesses. Amer et al. found that frail older adults were more susceptible to geriatric syndromes such as hearing impairment, urinary incontinence, and falls. [6].

Studies that reported the prevalence of geriatric syndromes in Africa were institutional-based rather than community-based [7,8]. The magnitude of health issues that older individuals residing in a community face remains unknown, particularly in Botswana and other developing countries. The first step in implementing comprehensive and targeted health initiatives for senior citizens across the country is to determine the extent of the geriatric syndromes.

The study aimed to describe the prevalence of geriatric syndromes among older adults living in the community in the Central Mahalapye sub-district, Botswana. In addition, we sought to evaluate the relationship between frailty with sociodemographic factors and other geriatric syndromes. Based on previous research findings [9,10], we hypothesise that certain sociodemographic factors and geriatric syndromes may have a significant effect on frailty.

Materials and Methods

Study Site, Design, and Period

This study was part of the cross-sectional quantitative survey we conducted to evaluate "The Prevalence of Geriatric Syndromes and Quality of Life in Older Adults in the Community in the Central Mahalapye Sub-District, Botswana" from April 2022 to January 2024. The Central Mahalapye sub-district is comprised of more than 35 villages and localities; the sub-district was home to 7846 individuals aged 65 years and older, as indicated by the 2011 Botswana census [11]. Batswana Old adults register with the Botswana Pension Office to receive a monthly pension amount of BWP 830.00 (USD 50).

Study Population, and Sample Size

We calculated the sample size using the formula: $n' = \frac{NZ^2P(1-P)}{d^2(N-1)+Z^2P(1-P)}$.

Where n' is the sample size with finite population correction, N is the population size (7846), Z is the statistic level of confidence (1.96), P is the expected proportion (50% as unknown), and d is the precision (5%). We increased the sample size by 10% to account for non-responders. Therefore, the study selected at least 402 older adults from the community.

Inclusion and Exclusion Criteria

The study included Batswana older adults from the Central Mahalapye sub-district. At least six months of residence in the sub-district and 65 years of age were requirements for inclusion in the study. We excluded those

hospitalised for a minimum of three months before the research period, and those not eligible for benefits from the Botswana Pension Office.

Subject Recruitment

We obtained the roster of elderly individuals from the Botswana Pension Office. Research assistants (including University of Botswana family medicine residents and medical students on rotation in family medicine) conducted recruitment in the three main villages as follows: 160 older adults from Mahalapye, 60 from Shoshong, and 40 from Sefhare. To enrol individuals from these villages, research assistants employed a systematic random selection method. They chose every fourth household in Mahalapye (46418/11997), Shoshong (11894/3104), and Sefhare (5295/1297) based on the Google village map, starting from a blind spot.

In addition, we used Microsoft Excel to randomly choose 150 elderly individuals from the Botswana Pension Office's roster to be recruited by research assistants. To do this, we used Microsoft Excel to randomly choose 15 individuals from each of the 10 research villages (also randomly selected).

Data Collection and Analysis

Research assistants administered a questionnaire to collect participants' age group, gender, education level, and living arrangements. Those with secondary or tertiary education were classified into high education, while those with non-formal or primary education were grouped into low education. We also assigned those who were single, divorced, widows, or widowers to the living without partner group, and those who were married or living together with a partner to the living with collaborate group.

The second component of the data collection tool consisted of a 2–5 minute interview and physical examination to collect information about geriatric syndromes.

To evaluate ADL, we used Katz's six fundamental tasks (each item has one point) [4]. We classify participants into the "no ADL impairment" group if they had full function (score 5–6) or in the "ADL impairment" group if they were somewhat or highly dependent (score 0–4). We also evaluated the Lawton IADL's eight domains of functioning [4]. Each item was scored on a Likert scale (completely unable = 1, with help = 2, without help = 3). We used only five items to score the IADL of male participants, removing three items (food preparation, housekeeping, and laundering). We classified the participants in the "no IADL impairment" group if the score was 18–24 for females and 11–15 for males or in the IADL impairment" group

The Nutritional Health Checklist, which contains 10 items and scores 0 to 21, helped assess participants' nutrition risk (for malnutrition) [4]. We then divided the participants into two categories: those with scores 0 to 5 in the "no nutrition risk" group and those with scores above 6 in the "nutrition risk" group.

We classified participants as having "no hearing impairment" if they could hear and repeat words spoken in a normal voice at 1 meter, and as having "hearing impairment" if they could not hear and repeat words spoken in a raised voice at the same distance.

We used the Tumbling E chart to evaluate visual impairment. We categorised, considering the best eye, those with visual acuity between 6/4.5 and 6/15 in the "no visual impairment" group, and those with visual acuity between 6/20 and unable to count fingers in the "visual impairment" group.

Participants who reported *urinary urges or stress* were classified as having *urinary* incontinence.

Research assistants instructed the participants to rise from a chair, walk for about 3 metres, turn, and then return to the chair. They observed the participants as they rose from the chair, maintained their balance while

standing, or walked, paying attention to whether they halted while speaking or fell onto a chair while attempting to sit. We classified older adults as "*frail"* if they had a standing balance problem (grabs support, falters, enlargement of the polygon), a walking problem (gait asymmetry, non-continuity, deviation from a path), stopped walking when talking or fell back to sit [4].

Research assistants also instructed participants to stand up next to a wall to assess *osteoporosis*. If the wall-occipital distance exceeded 0 cm or the rib-pelvis distance was less than two fingers' width, we considered osteoporosis [4].

Research assistants asked participants to bring their medication boxes or outpatient cards to determine the quantity of medications they were taking. *Polypharmacy* was defined as the concurrent use of five or more medications, including over-the-counter drugs. We classified individuals into the "*fall*" group if they had at least one fall within the previous year [4].

We used the mini-Cog tool, out of five points, to measure *cognitive impairment*. Research assistants asked participants to recall three words they previously had to retain, awarding one point for each recalled word. We awarded two points to participants who were able to draw or read the clock. A score of 0–2 points indicated a high likelihood of cognitive impairment, while a score of 3–5 points indicated a low likelihood of cognitive impairment. We used the Patient Health Questionnaire-2 (PHQ-2) to screen for depression symptoms. Participants were asked whether, during the past month, they had often been bothered by feeling down, depressed, or hopeless and had been bothered by little interest or pleasure in doing things. A positive response to the two questions about hopelessness and pleasure in doing things suggested a mood disorder/depression. [4,12].

We summarised information as frequency, mean (±s.d.), or median (±IQR) and tables where appropriate to describe socio-demographic information, geriatric syndromes, and QOL.

We conducted a multivariate analysis using binary logistic regression to determine the relationship between the independent variables (sociodemographic factors and other geriatric disorders) and frailty. To evaluate the strength of the association, we determined the adjusted odds ratio (AOR) and 95% confidence intervals (CI). Data analysis was done with IBM SPSS 29.0.0.0 (241). We set the significance level at $p<0.05$.

Validity and Reliability

Family medicine residents and medical students (research assistants) from the University of Botswana conduct the routine assessment of older adults in Mahalapye village. They are already acquainted with the BAT for CGA tool, so there was no need to evaluate its user-friendliness for the form.

Ethical Considerations

The researcher followed the Helsinki Declaration. The Botswana Ministry of Health and Wellness' Health Research and Development Division (HPDME: 13/18/1), the University of Botswana's Research Committee (UBR/RES/IRB/BIO/GRAD/284), and the Mahalapye Health District Ethical Committee (MH/DHMT/1/7/7 [43]) gave ethical approval.

Results

The study included a total of 414 older adults. Table 1 shows the sociodemographic characteristics of the older adults who participated in the study. Participants sex ratio was almost 2:1 as 63.8% were female and 36.2 % were male. About six in ten (n=238, 57.5%) participants were between the ages of 65 and 74. Out of the total number of participants, 172 individuals (41.5%) were living with their partners; most of those were male (n=107, 71.3%). Only 38 (9.2%) participants had a high education level.

Table 1. Sociodemographic Characteristics of Participants, Older Adults Living in Community in the Central Mahalapye Sub-District Study

Characteristics of Participants	Sex		
	Male	Female	n (%)
	n=150 (36.2)	n=264 (63.8)	
Age Group n (%)			
65–74 years	79 (52.7)	159 (60.2)	238 (57.5)
75–79 years	37 (24.7)	36 (13.6)	73 (17.6)
80–84 years	20 (13.3)	42 (15.9)	62 (15.0)
≥ 85 years	14 (9.3)	27 (10.2)	41 (9.9)
Living Arrangement n (%)			
Living without partner	43 (28.7)	199 (75.4)	242 (58.5)
Living with partner	107 (71.3)	65 (24.6)	172 (41.5)
Level of Education n (%)			
Low education level	132 (88.0)	244 (92.4)	376 (90.8)
High education level	18 (12.0)	20 (7.6)	38 (9.2)

Figure 1 presents the frequency of geriatric syndromes among older persons living in the community who participated in this study. IADL impairment was present in most participants (328, 79.2%). Visual impairment (n =245, 59.2%), mood disorder/depression (n= 237, 57.3%), or malnutrition (n= 261, 63.0%) were all present in over half of the participants. We identified 195 (47.1%) individuals as frail. In about one-third of the cases, participants had hearing impairment (n = 126, 30.5%) or reported that they had had at least a fall in the last year (n = 117, 28.3%). Two in ten cases had osteoporosis (n = 78, 18.8%), cognitive impairment (n = 71, 17.2%), or polypharmacy (n = 68, 16.4%). There were only 23 (5.6%) individuals with ADL impairments.

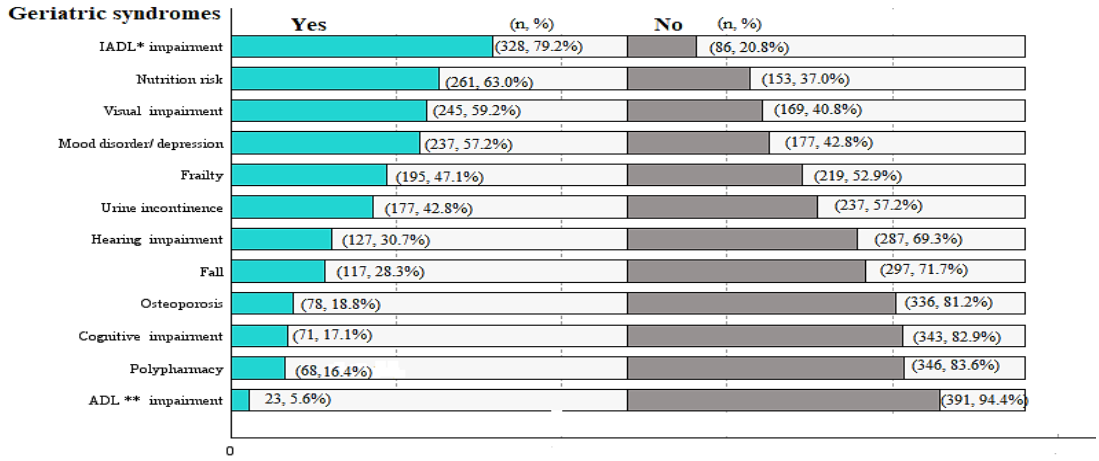

Figure 1. Frequencies of Geriatric Syndromes Among Older Adults Living in Community in the Central Mahalapye Sub-District Study

*Instrumental Activity of Daily Living, ** Activity of Daily Living

We conducted a multivariate logistic regression analysis to assess how factors such as socio-demographic factors and other geriatric syndromes affected frailty (Table 2). The total model demonstrated statistical significance compared to the null model, with a chi-square value of 202.459 and a p-value of less than 0.001. The predictor variables in the

model account for 52% of the change in the criterion variable (Nagelkerke R^2 = 51.7%). Overall, the accuracy rate was good at 74.1%. The model accurately predicted 66.5% of frail older adults to be frail, demonstrating good sensitivity compared to non-frail older adults.

High education level, living with a partner, urinary incontinence and cognitive impairment had an impact on frailty ($p < 0.05$). Older adults with high education were 81% less likely to be frail (AOR: 0.194, 95% CI 0.109–0.345, p<0.001), and those who lived with their partners were 61% less likely to be frail (AOR: 0.391, 95% CI 0.224–0.682, p<0.001). Older adults with urinary incontinence were 66% less likely to be frail (AOR: 0.349, 95% CI: 0.165–0.737). However, older adults who reported falling were 11 times more likely to be frail (AOR: 10.545, 95% CI: 4.887–22.753, p<0.001), and those who had cognitive impairment were 4 times more likely to be frail (OR = 3.486, 95% CI: 1.1505–7.992, p = 0.004).

Older adults who have impaired ADL, IADL, hearing, and osteoporosis may be more prone to frailty. The AOR for these conditions are 1.686, 1.134, 1.394, and 2.145, respectively. However, the observed differences between frail and non-frail older adults were not statistically significant as p>0.05.

Table 2. Multivariate Logistic Regression Analysis Frailty and Socio-Demographic Factors and Other Geriatric Syndromes Among Older Adults Living in Community in the Central Mahalapye Sub-District

		B[b]	**Wald Chi-square**	**p-value**	**AOR**[c]	**AOR 95% C.I.**[d]
Step 1[a]	Age group	-.031	.042	.837	.970	.723–1.301
	Education level	-1.639	31.246	<.001*	.194	.109–.345
	Living arrangement	-.938	10.934	<.001*	.391	.224–.682
	ADL[e] impairment	.522	.874	.350	1.686	.564–5.038
	IADL[f] impairment	.126	.156	.692	1.134	.607–2.119
	Nutrition risk	-.014	.002	.961	.986	.554–1.754
	Visual impairment	-.148	.304	.582	.862	.509–1.461
	Hearing impairment	.332	.988	.320	1.394	.724–2.682
	Urine incontinence	-1.053	7.620	.006*	.349	.165–.737
	Fall	2.356	36.042	<.001*	10.545	4.887–22.753
	Polypharmacy	.007	.000	.987	1.007	.428–2.368
	Osteoporosis	.763	3.156	.076	2.145	.924–4.980
	Cognitive impairment	1.244	8.520	.004*	3.468	1.505–7.992
	Depression/ mood disorder	.159	.277	.599	1.172	.648–2.119
	Constant	-.914	.300	.584	.401	

[Variable](s) entered in step 1: Age Group, Education Level, Living Arrangement, Activity of Daily Living, Instrumental Activity of Daily Living, Nutrition Risk, Visual Impairment, Hearing Impairment, Urine Incontinence, Fall, Polypharmacy, Osteoporosis, Cognitive Impairment, Depression/Mood Disorder; [estimated] Coefficient; [adjusted] Odd Ratio; [d]95% Confident Interval; [e]ADL, Activity of Daily Living; [f]IADL, Instrumental Activity of Daily Living.

Discussions

This study investigated the occurrence of geriatric syndromes among older adult individuals residing in the Central Mahalapye sub-district of Botswana. Additionally, the study explored the potential association between frailty, demographic characteristics, and some geriatric syndromes.

In this study, 41.5% of participants were living with their partners and most of those were male. Also, few (9.2%) participants had a high education level. It is common for older adult males to engage in dating later in life compared to females. Older adults' attitudes towards seeking a new partner differ based on their gender and age, particularly those who are 70 years old or younger [13]. These likely accounts for the high percentage of older adult females living without partners. Older people are among the population groups with the lowest levels of education, as their formative years occurred when Botswana's formal educational system was less accessible than it is today.

The current study revealed that most participants (79.2%) had geriatric syndromes, particularly IADL impairment. Additionally, over half of the participants were at risk of malnutrition (63.0%), had a mood disorder/depression (57.3%), or had visual impairment (59.2%).IADL necessitates a greater degree of personal autonomy, and its evaluation is based on tasks that necessitate a sufficient capacity to make decisions and interact with the environment. Millá n-Calenti et al. found that over half of the elderly individuals in Narón, A Coruña, Spain had at least a moderate impairment in their IADL [14]. Although older persons receive a monthly pension income of P830 (equivalent to around US dollar 50), about 40% of them reported being at a high risk of malnutrition. Given the high unemployment rate in rural areas of Botswana, where the average home consists of approximately 3.3 individuals, other household members can rely on the pension allowance. We did not check the extent to which alcohol consumption in older adults or mouth/tooth illness contributed to the high nutrition risk (for malnutrition). Also, mouth/tooth illnesses are very common in older adults; edentulism affects nutritional intake and increases malnutrition risk by 21% [15]. The lower prevalence of depression of 7.4%, in their Botswana study. However, these authors employed a non-probability sampling technique known as snowballing. [16]; this could explain the observed disparity in prevalence between the two studies in terms of the prevalence of depression symptoms among older adults in Botswana. The dissimilar prevalence of visual impairment in their systematic review in Ethiopia as visual impairment was diagnosed in one to three out of ten [17].

In this study, in approximately one-third of the cases, participants reported that they had experienced at least one fall in the past year (28.3%) or had hearing impairment (30.5%). Additionally, in two out of every ten cases, osteoporosis (18.8%), cognitive impairment (17.2%), and polypharmacy (16.4%) were present. A small proportion (5.6%) of older adults had trouble with ADL. Researchers reported almost similar findings. For instance, reports found that approximately two out of every ten older adults have urinary incontinence [2] Bainbridge et al. reported similar findings, as 31% of those between the ages of 60 and 69 had hearing loss. [18]. In their polypharmacy systematic review and meta-analysis study, which took into account 54 studies, a combined prevalence of polypharmacy of 37%, which was found to be higher than the prevalence observed in the present study [19]. Traditional healers' prescriptions were not considered in the present study, even though Batswana high consumption of traditional medicine.

The current study found a prevalence of frailty that was comparable to that of Takele et al.'s study in Ethiopia, which reported a 39%

prevalence. The Tilburg frailty indicator, a self-reporting tool that did not involve any physical examination [20].

In this study, high education level, living with a partner, urinary incontinence and cognitive impairment had an impact on frailty ($p < 0.05$). Older adults with high education were 81% less likely to be frail, and those who lived with their partners were 61% less likely to be frail. The research 13-year longitudinal research in the Netherlands and found that those with a low educational level had a 76% higher likelihood of becoming frail [21]. Living with a partner fosters dynamic and encouraging social connections, while also decreasing the likelihood of one's partner experiencing physical decline [22]. Contrary to numerous reports, it was unexpected to discover in our research that older adults with urinary incontinence exhibited a 66% reduced likelihood of being frail [23,24,25]. Future research is necessary to identify the factors that could explain this finding among the older adult population in the Mahalapye health district. The present study observed that frailty was eleven times more prevalent among elderly adults who reported falling and four times more prevalent among those with cognitive impairment.

The study recruited older adults who were clients of the Botswana Pension Office. For the selection of participants from small villages, a random sampling method was employed, while a systematic sampling method was utilised in large villages, including Mahalapye, Shoshong, and Sefhare villages. However, due to restrictions on the Botswana Pension Office's roster, which does not include all Batswana older adults and potential issues with list updates, the sample may not have been representative. The present study utilised the BAT for CGA, a tool for primary healthcare that allows practitioners to perform a CGA in two to five minutes [4]. BAT for CGA's validity and reliability has not been performed yet in an African rural setting.

In the future, we aim to investigate how variables such as family size (despite pension allowance), alcohol consumption, oral health issues, and tooth loss may influence the nutritional vulnerability of older persons in Sub-Saharan Africa, with a specific focus on Botswana. We want to assess the impact of traditional medicine on frailty and falls, as a considerable proportion of elderly individuals in Botswana see traditional healers before obtaining medical help from modern healthcare facilities.

Conclusion

This study's goal was to find out how common geriatric syndromes are and if there is a link between frailty, demographic factors, and certain geriatric syndromes in the elderly population of Botswana's Central Mahalapye sub-district Most older adults had geriatric syndromes, particularly IADL impairment.

About half of the participants were at nutrition risk (of malnutrition), had a mood disorder or depression, had visual impairment or were frail. In approximately one-third of cases, participants reported hearing impairment or having experienced at least one fall in the past year. Furthermore, we observed osteoporosis, cognitive impairment, and polypharmacy in two out of every ten cases. A small number of senior citizens encountered difficulties with their daily activities. In this study, factors such as high education level, living with a partner, urinary incontinence, and cognitive impairment influenced frailty.

We intend to explore the potential impact of family size (despite pension allowance), alcohol consumption, oral health issues, and tooth loss on the nutritional vulnerability of elderly individuals in Sub-Saharan Africa, with a particular emphasis on Botswana. We are interested in evaluating the influence of traditional medicine on frailty and falls in Botswana, as a significant number of elderly individuals consult traditional healers before

seeking medical assistance from modern healthcare facilities.

Conflict of Interest

There was no conflict of interest. The authors funded this study.

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